



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	COMPUTER SCIENCE		
SUBJECT	COMPUTER NETWORKS		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50166-Discipline Informatiche		
CODE	06232		
SCIENTIFIC SECTOR(S)	INF/01		
HEAD PROFESSOR(S)	LENZITTI BIAGIO	Ricercatore	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	9		
INDIVIDUAL STUDY (Hrs)	153		
COURSE ACTIVITY (Hrs)	72		
PROPAEDEUTICAL SUBJECTS	05880 - PROGRAMMING AND LABORATORY - INTEGRATED COURSE 16670 - ALGORITHMS AND DATA STRUCTURES 16784 - OPERATING SYSTEMS 16450 - COMPUTER ARCHITECTURES 16671 - THEORETICAL COMPUTER SCIENCE		
MUTUALIZATION			
YEAR	3		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	LENZITTI BIAGIO Monday 09:00 11:00 Studio 201 Dipartimento di Matematica e Informatica		

<p>PREREQUISITES</p>	<p>Knowledge and know how to make a C program using complex data structures like arrays and pointers. Know the main concepts of graph theory. Know the main concepts of the theory of Finite-state machine and Representation of a finite-state machine.</p>
<p>LEARNING OUTCOMES</p>	<p>Knowledge and understanding of networks and circuit switching and packet switching protocol. Knowledge and understanding of ISO/OSI and the TCP / IP stack. Knowledge and understanding of the host-to-network level and technologies and components of Ethernet. Knowledge and understanding of the IP layer. Knowledge and understanding of autonomous systems, the Routing algorithms on the Internet, the ICMP protocol. Knowledge and understanding of the transport layer and the UDP and TCP protocols. Knowledge of the Domain Name System. Knowledge and understanding of the application layer and some protocols: WWW, client and Web server http, ftp, ect. Knowledge and understanding of the problems with Client / Server and Web application programming. Applying knowledge and understanding to assess the functionality of the various network protocols. Applying knowledge and understanding to assess the performance of a network. Applying knowledge and understanding to design and develop a Client / Server application through concurrent and multi-process programming in C language. Applying knowledge and understanding to design and develop a Web Application Server side in PHP7 and/or Client side in JQuery or NodeJs. Applying knowledge and understanding to assess and compare their own solutions to a complexity limited problem Learning skills to organize themselves into working groups. Ability to communicate effectively in oral form even using English terms. Learning skills to catalog, schematize and revise acquired notions. Learning outcomes: -Design and develop for a corporate customer a simple client-server socket-based application. -Write a program for a client that correctly terminates when all concurrent tasks terminate by considering actors and/or reactive processes, deadlocks, and properly synchronized queues.</p>
<p>ASSESSMENT METHODS</p>	<p>The evaluation includes two tests, a design test and an oral test. The project proof will consist in the realization and implementation of a project Client/Server based on the TCP and UDP network protocols and/or a Web application project developed with PHP JQuery and/or nodejs . The project can be carried out either individually or by a team consisting of a maximum of two students, in order to encourage the development of the ability to work in a team. The revision of the project will have to take place in the presence of all the students of the team, during which the individual contribution of each team member will occur and an individual evaluation will be assigned to each student according to the individual contribution. The originality of the proposed solution, the methodological rigor, the demonstration of having fully acquired the technical tools provided by the course, will contribute to a positive evaluation. The weight with respect to the total design test runs from 0/10 up to a maximum of 10/10, with a minimum score to pass the 6/10 test. The requirements to achieve the minimum score to access the second part of the exam are the ability to carry out a project that, although in a basic way, respects the assigned specifications and is correct. The oral test will serve to verify the knowledge acquired during the course, the autonomy in deepening even complex contents and the individual ability to find solutions to proposed problems. The oral exam will start with the presentation of a topic chosen among those proposed during the course, therefore, the critical capacity and the autonomy of judgment of the student will be verified through an appropriate number of questions. The evaluation of the oral exam goes from 0/20 to 20/20, the modalities for evaluation for the oral exam is the following:from 0/20 to 11/20 knowledge / skills not sufficiently, 12/20 at least elementary knowledge / skills, 13/20 knowledge / skills a bit more 'than elementary, 14/20 knowledge / skills almost sufficiently acquired, 15/20 knowledge / skills sufficiently acquired, 16/20 knowledge / skills discretely acquired, 17/20 knowledge / skills more' than discretely acquired, 18 / 20 knowledge / skills almost excellently acquired, 19/20 knowledge / skills excellently acquired, 20/20 knowledge / skills more than excellently acquired. The oral vote will complement in linear way the score achieved by each student following the evaluation of the project.</p>
<p>EDUCATIONAL OBJECTIVES</p>	<p>Provide methodological and technical basic skills on Computer network</p>
<p>TEACHING METHODS</p>	<p>Lectures using computer for presentations and development of CLient/Server</p>

	programs in C language and Web Application in PHP JQuery and NodeJs.
SUGGESTED BIBLIOGRAPHY	<p>Reti di calcolatori e internet Un approccio top-down • 7/Ed. • Con MyLab , James F. Kurose e Keith W. Ross, Pearson ,ISBN 8891902543, Testo di riferimento</p> <p>Introduzione alla programmazione ClientServer , Dario Maggiorini, Pearson 2009, Pearson Education Italia, 2009. ISBN 9788871925462, Testo consigliato per gli approfondimenti inerenti la parte di programmazione in C https://www.w3schools.com/ Sito consigliato per gli approfondimenti inerenti Html5 , PHP e JQuery.</p> <p>https://nodejs.org/it/docs/ Sito consigliato per gli approfondimenti inerenti a NodeJs</p>

SYLLABUS

Hrs	Frontal teaching
1	Presentation of the course
2	Physical transmission of signals
2	Introduction to Computer Networks and Internet
2	Delay, Loss, and Throughput in Packet-Switched Networks
3	The Internet protocol stack and OSI reference model
2	World Wide Web and http protocol
5	FTP, email, DNS,SSH
2	Traceroute, ping, simulation of Ftp and SMTP with telnet
5	Transport Layer UDP , TCP and SCTP. TCP e SCTP Connection Management
4	Transport Layer TCP, TCP Principles of Reliable Data Transfer, Congestion Control
4	Network layer, The Internet Protocol (IP), NAT Internet Control Message Protocol (ICMP)
4	The Link Layer, Links, Access Networks, and LAN ARP
4	Application level. Main features and socket programming, Client / Server TCP and UDP programming
3	LAN network protocol, ALOHA, Slotted ALOHA, Carrier Sense Multiple Access (CSMA)
4	Notes on Wireless Networks
2	HTML5 and CSS
4	The PHP 7 language, examples of dynamic web and interface with mysql
4	Client-side web programming with JQuery, comparison with PHP7
5	Client-side Web programming, change paradigm with NodeJs, differences with PHP7 and JQuery
4	C programming with TCP and UDP socket of the application layer protocols HTTP
4	C programming with TCP and UDP socket of the application layer protocols FTP
2	Programming in C of the lower layer protocols